

the PTO's reception date of 9 May 2000, thereby indicating that the 4 May 2000 amendment was received by the PTO on 9 May 2000 and thus should have been considered during the examination that led to the present Office Action. If the 4 May 2000 amendment was not taken into account during the examination that led to the present Office Action, this amendment should now be taken into account.

The specification has been revised to clarify/correct the grammar and to correct various errors in capitalization, reference-symbol utilization, figure identification, and singular-vs-plural case. In addition, the phrase "in that line" has been added after "activated imaging elements 68" in the first full paragraph on page 15 to clarify which imaging elements 68 are being dealt with in that paragraph. On page 17, "e.g.," has been inserted at the beginning of the parenthetical expression "(black-and-white)" directly after "monochrome" because a monochrome display is not limited to black and white. For example, a monochrome display can be black and green.

The adjective "shutter" has been inserted before "control elements 72" in two instances on pages 22 and 28 of the specification to be consistent with the reference to "shutter control elements 72" elsewhere on page 28. The term "image-providing control element 72" has been corrected to "light-providing control element 72" in one instance on page 28. A similar correction has been made on page 29. On page 46, "electron-emissive element 162" has been corrected to "light-emissive element 162". Finally, the status of U.S. patent application Ser. No. 08/683,789 cited on page 37 has been updated to indicate that Ser. No. 08/683,789 has issued into U.S. Patent 5,898,266.

The claims have been revised in several aspects. Claims 1, 30, 50, 57, 70, 103, 115, 125, 127, and 130 have been amended. Claims 5 and 60 - 65 have been cancelled. Accordingly, Claims 1 - 4, 6 - 59, and 66 - 130 are now pending.

Claims 1 - 12, 15 - 21, 28, 29, 40 - 44, 57 - 59, 66 - 81, 84 - 87, 93 - 97, 119, 124, 125, and 127 - 130 have been rejected under 35 USC 102 (b) as anticipated by Jones, U.S. Patent 5,175,637 ("Jones"). This rejection is respectfully traversed in view of the revisions to the claims.

As a further preliminary matter, the rejection of Claim 119 as anticipated by Jones seems inconsistent with the rejection, discussed further below, of dependent Claim 118 as obvious based on Jones in view of Curtin, U.S. Patent 5,686,790 ("Curtin 790"). Claim 119 depends from Claim 118. Hence, the present rejection of Claims 118 and 119 results in the anomalous situation in which one claim has been rejected as obvious based on multiple references whereas another claim which depends from the first-mentioned claim and which thus includes all the limitations of the first-mentioned claim plus some additional limitation(s) has been rejected as anticipated by one of the references used in the obviousness rejection of the first-mentioned claim.

Applicants' attorney notes that Claim 119 repeats the further limitation of dependent Claim 35 and that Claim 118 similarly repeats the further limitation of dependent Claim 34 from which Claim 35 depends. Applicants' attorney also notes, as discussed further below, that Claims 34 and 35 have been rejected as obvious based on Jones in view of Curtin 790. In light of this, Applicants' attorney will treat Claim 119 as being rejected as obvious based on Jones and Curtin 790 rather than as being anticipated by Jones. If this treatment of Claim 119 is incorrect, please inform Applicants' attorney of how the apparently inconsistent rejections of Claims 118 and 119 are to be resolved.

Turning now to the substance of the anticipation rejection, each of independent device Claims 1, 57, and 66 is directed to a display having a set of shutter strips. Each of independent method Claims 125, 127, and 129 is directed to a method of manufacturing a

display having a set of shutter strips or to a method of utilizing a set of shutter strips to enhance an image. Accordingly, a set of shutter strips is a limitation of each of independent Claims 1, 57, 66, 125, 127, and 129.

The remaining claims are dependent claims and thus likewise are each limited to a set of shutter strips. In short, a set of shutter strips is a limitation of every pending claim.

Hence, a set of shutter strips is a limitation of each of Claims 1 - 12, 15 - 21, 28, 29, 40 - 44, 57 - 59, 66 - 81, 84 - 87, 93 - 97, 124, 125, and 127 - 130 rejected as anticipated by Jones.

Jones describes various displays having enhanced image contrast. Some of Jones' displays have shutters and, in some of Jones' shuttered displays, the shutters are segmented. In particular, the displays of Figs. 9, 10b, and 11 in Jones have segmented shutters. Each of the remaining displays in Jones either has a non-segmented shutter or lacks a shutter.

With regard to independent Claims 1, 57, 66, 125, 127, and 129, the Examiner says that Jones "teaches a backlit display, an imaging cell on which an image is formed, a source of pulsed backlighting which sequentially illuminates portions of the imaging cell, a shutter in front of the imaging cell, comprising a plurality of segments, each segment being switchable between a substantially transparent state and a strongly light absorbing state and being associated with a portion of the imaging cell which is being illuminated in sequence, and a switching means for switching each segment synchronously with the pulsed backlighting such that each segment is in its substantially transparent state when the source of pulsed backlight is not illuminating such portion of the imaging cell (column 3, lines 9-28)". The material referred to here by the Examiner appears to deal with the backlit display shown by Jones in Fig. 10b. Jones describes the display of Fig. 10b generally at col. 3, lines 9 - 28, and more specifically at col. 7, lines 10 - 29.

As far as Applicants' attorney can determine, the reasons presented in the Office

Action for rejecting Claims 1, 57, 66, 125, 127, and 129 as anticipated by Jones do not rely on the material dealing with either of Jones' other two displays having segmented shutters. That is, the reasons giving for rejecting Claims 1, 57, 66, 125, 127, and 129 on anticipation grounds do not appear to rely on (a) the self-luminous display shown in Fig. 9 of Jones as described generally at col. 2, lines 43 - 60, and more specifically at col. 6, line 55, through col. 7, line 9, or (b) the reflective display shown in Fig. 11 of Jones as described generally at col. 3, lines 45 - 61, and more specifically at col. 7, lines 30 - 55. However, the Examiner refers to col. 3, lines 49 - 54, i.e., part of the material dealing with the display shown in Jones' Fig. 11, in presenting the reasons for rejecting Claims 18 and 72 as anticipated by Jones. In any event, to be complete, Applicants' attorney will consider the material dealing with Jones' displays in all of Figs. 9, 10b, and 11 in responding to the anticipation rejection.

With the foregoing in mind, each of independent Claims 1, 57, 66, 125, 127, and 129 is limited to a set of shutter strips arranged so that each shutter strip is situated in front of one or more associated imaging lines. The displays in Figs. 10b and 11 of Jones have segmented shutters. However, Jones does not disclose that the segments of the shutter in the display of Fig. 10b or 11 are configured as strips situated in front of lines of the display's image.

More particularly, Jones specifies at col. 7, lines 21 - 29, that shutter 53b in the display of Fig. 10b is segmented "with a segment corresponding to each light source 52" and that "Synchronizer switch 54 synchronizes the firing of each light source 52 and the switching of each segment of shutter 53b, so that the segment corresponding to each light source is transparent when that light source is on, and dark when that light source is off". Shutter 53b thus appears to be configured so that there is a different shutter segment in front of each different light source 52.

An imaging line, as utilized in each of Claims 1, 57, 66, 125, 127, and 129, has

multiple light sources. To the extent that any of light sources 52 in the display of Jones' Fig. 10b might be arranged to implement an imaging line, the material at col. 7, lines 21 - 29, of Jones seems to indicate that shutter 53b would have multiple segments situated in front of each imaging line. A different segment of shutter 53b would thus be situated in front of each different light source 52 in each such imaging line. This shutter configuration is different from that covered by Claims 1, 57, 66, 125, 127, and 129 where each shutter strip is situated in front of one or more associated imaging lines.

In any case, neither of the displays shown in Figs. 10b and 11 of Jones or the associated text discloses the limitation of any of Claims 1, 57, 66, 125, 127, and 129 that a set of shutter strips be arranged so that each shutter strip is situated in front of one or more associated imaging lines. Consequently, none of Claims 1, 57, 66, 125, 127, and 129 is anticipated by the material dealing with the displays of Jones' Figs. 10b and 11.

The display in Fig. 9 of Jones contains conventional CRT 46 and overlying segmented shutter 47. At col. 6, line 68, through col. 7, line 5, Jones states that "Stripes are a convenient shape for the segments" and that "Synchronizer switch 48 synchronizes the switching of the segments with the raster scan such that each segment is transparent when the phosphors behind it are emitting light, but light absorbent when they are not". Jones further states at col. 7, lines 5 - 9, that "Although the display in FIG. 9 is shown as a CRT display, those skilled in the art will understand that this invention can be used with other self-luminous displays, such as plasma and electroluminescent displays".

In a raster scan CRT display as implemented with conventional CRT 46 in Fig. 9 of Jones, an electron beam scans across the image area in a pattern of prescribed lines. When the electron beam reaches a location (point) on one of these lines, the electrons emitted by the electron beam cause phosphor at that location to emit light. After the electron beam

passes that location (point), the phosphor at that location rapidly ceases to emit light until the electron beam again reaches that location. Because the electron beam scans the image area in this way, the periods of time during which the pixels (for a monochrome display) or subpixels (for a color display) in an imaging line emit light differ in time. In particular, the image portions produced by the light provided by the pixels or subpixels of each imaging line in the display of Fig. 9 of Jones are displayed sequentially in time. *CRT - not EL - W.*

Each of Claims 1, 57, 125, and 127, as amended, requires that largely all of the image part produced by the light provided by each imaging line be displayed largely simultaneously at any time when that image part is being displayed. Because the image parts produced by the light provided from the pixels or subpixels of each imaging line in the display of Fig. 9 of Jones are displayed sequentially in time, the display of Jones' Fig. 9 does not meet the preceding requirement of Claims 1, 57, 125, and 127. Accordingly, none of Claims 1, 57, 125, and 127 is anticipated by the material describing the display of Jones' Fig. 9. *CRT - embold not for plasma or Electrolum.*

As to the statement at col. 7, lines 5 - 9, of Jones that "Although the display in FIG. 9 is shown as a CRT display, those skilled in the art will understand that this invention can be used with other self-luminous displays, such as plasma and electroluminescent displays", the manner in which the pixels or subpixels of an imaging line in a plasma or electroluminescent display provide light to produce that line's part of the display's image can have various time dependencies. That statement at col. 7, lines 5 - 9, of Jones does not inherently disclose the limitation of each of Claims 1, 57, 125, and 127 that largely all of the image part produced by the light provided by each imaging line be displayed largely simultaneously at any time when that image part is being displayed. The statement at col. 7, lines 5 - 9, in combination with the material describing the display of Jones' Fig. 9 thus does not anticipate any of Claims 1, 57, 125, and 127. *why*

As far as Applicants' attorney can determine, no other material in Jones discloses all the subject matter of any of Claims 1, 57, 125, and 127. Furthermore, nothing in Jones suggests all the subject matter of any of Claims 1, 57, 125, and 127. Hence, Claims 1, 57, 125, and 127 are patentable over Jones.

Turning to independent Claims 66 and 129, device Claim 66 specifies that the claimed display contains a control component which "utilizes light [emphasis added] in causing the shutter strips to be selectively placed in their light-transmissive and light-absorptive states". Method Claim 129 similarly recites that light is utilized "to cause the shutter strips to be selectably placed in their light-transmissive and light-absorptive states".

The display in Fig. 9 of Jones contains synchronizer switch 48. However, nowhere does Jones disclose that switch 48 employs light for synchronizing the switching of the strip-shaped segments of shutter 47 with the raster scan so that each shutter strip is transparent when the phosphor behind that shutter strip is emitting light and is otherwise light absorbent. The material dealing with the display in Jones' Fig. 9 does not meet the limitation of Claim 66 or 129 that light be utilized to control the switching of the shutter strips. Consequently, neither of Claims 66 and 129 is anticipated by the material dealing with the display in Jones' Fig. 9.

Returning briefly to the displays shown in Figs. 10b and 11 of Jones, the display of Fig. 10b contains synchronizer switch 54. The display of Fig. 11 contains synchronizer switch 60. As with the display of Fig. 9, Jones does not disclose that either of switches 54 and 60 utilizes light for synchronizing the switching of the segments of the associated shutter to the light being provided from the underlying screen. The material dealing with the displays of Jones' Fig. 10b and 11 thus also fails to meet the limitation of Claim 66 or 129 that light be utilized to control the switching of the shutter strips. This is a separate reason

why neither of Claim 66 and 129 is anticipated by the material dealing with the display in Jones' Fig. 10b or 11.

Jones' other shuttered displays, i.e., the displays having non-segmented shutters, all have synchronizer switches. While the synchronizer switches in these other shuttered displays along with the synchronizer switches 48, 54, and 60 in the displays of Figs. 9, 10b, and 11 all variously control light furnished by these displays, none of the synchronizer switches appears to utilize light in performing the shutter synchronization action. Nothing in Jones would provide a person skilled in the display art with any suggestion or motivation for utilizing light in performing the shutter synchronization action. Accordingly, Claims 66 and 129 are patentable over Jones.

Claims 2 - 12, 15 - 21, 28, 29, 40 - 44, 58, 59, 67 - 81, 84 - 87, 93 - 97, 124, 128, and 130 all variously depend (directly or indirectly) from independent Claims 1, 57, 66, 127, and 129. Hence, dependent Claims 2 - 12, 15 - 21, 28, 29, 40 - 44, 58, 59, 67 - 81, 84 - 87, 93 - 97, 124, 128, and 130 are patentable over Jones for the same reasons as independent Claims 1, 57, 66, 127, and 129. In addition, certain of these dependent claims are separately patentable over Jones.

Dependent Claims 7 and 76 each recite that "each shutter strip is also in its light-transmissive state largely when each activated imaging line associated with that strip is essentially fully black" during display operation.

In regard to Claims 7 and 76, the Examiner alleges that Jones "teaches a shutter strip/segment in its light-transmissive state when the activated image line/cell associated with that strip is dark (column 4, lines 54-59)". This is incorrect. The portion of Jones parenthetically cited by the Examiner deals with the projection display of Figs. 1a and 1b having a non-segmented screen but no shutter. Consequently, the cited portion of Jones does



not disclose the further limitation of Claim 7 or 76. As far as Applicants' attorney can determine, nowhere else does Jones disclose the further limitation of either of these two claims. Claim 7 and 76 are thus separately patentable over Jones.

Dependent Claims 8 and 77 each recite that "a variable selectable plurality of consecutive ones of the shutter strips are simultaneously in their light-transmissive states when at least one other of the shutter strips is in its light-absorptive state" during display operation.

Regarding Claims 8 and 77, the Examiner states that Jones "teaches a shutter in front of the imaging cell comprising a plurality of segments being switchable synchronously between a transparent state and a light absorbing state (column 3, lines 14-28)". While the Examiner's statement seems correct, Claims 8 and 77 each require that a variably selectable plurality of consecutive ones of the shutter strips, i.e., multiple consecutive shutter strips, be simultaneously in their light-transmissive states when at least one other shutter strip is in its light-absorbent state. As far as Applicants' attorney can determine, Jones does not disclose that multiple strips of the shutter in the display of Fig. 9 are simultaneously in their light-transmissive states at any time. Nor does Jones even appear to disclose that multiple segments of the segmented shutter in the display of Fig. 10b or 11 are simultaneously in their light-transmissive states at any time. Consequently, Claims 8 and 77 are separately patentable over Jones. The same applies to Claims 9 and 78 since they respectively depend from Claims 8 and 77.

Dependent Claims 9 and 78 each recite that "the selectable plurality of shutter strips are simultaneously in their light-transmissive states when a variably selectable one of the imaging lines associated with that plurality of shutter strips is activated and each other imaging line associated with that plurality of shutter strips is deactivated". In other words,

Claims 9 and 78 cover the situation in which multiple i.e., two or more, shutter strips are simultaneously in their light-transmissive states even though only one imaging line associated with those shutter strips is activated.

Regarding Claims 9 and 78, the Examiner states that Jones "teaches an embodiment of his invention whereby the screen need not switch entirely all at once but many do so in segments (column 5, lines 43-44), and is synchronously switchable such that the front layer is in its transparent state when the projector is projecting an image and in its dark state when the projector is not (column 5, lines 11-24)" and that "This is inherently similar to Applicant's claim of display wherein plurality of the shutter strips are simultaneously in their light-transmissive states when activated while the other associated imaging lines are deactivated". The portions of Jones parenthetically cited by the Examiner deal with a display lacking a shutter and thus are not on point for Claims 9 and 78. Nonetheless, even if the Examiner were to cite a portion of Jones dealing with a display having a segmented shutter, Jones would still not disclose the limitation of Claim 9 or 78 that multiple shutter strips be simultaneously in their light-transmissive state when only one imaging line associated with those shutters strips is activated. This provides a separate basis for allowing Claims 9 and 78 over Jones.

Dependent Claims 15 and 84 each recite that "one of the shutter strips is in its light-transmissive state while the selection signal for each imaging line associated with that shutter strip is not at that selection signal's selection condition". Jones does not disclose this limitation. Hence, Claims 15 and 84 are separately patentable over Jones.

Claims 17 and 71 each recite that "the control component comprises a group of control elements for selectively providing light that determines placement of the shutter strips in their light-transmissive and light-absorptive states". Claim 79, which has been

amended to depend from Claim 71, reads as follows:

79. A display as in Claim 71 wherein:  
each imaging line is activated in response to a different corresponding one of a multiplicity of selection signals; and  
the control elements are responsive to the selection signals, or/and at least one selection generation signal utilized in generating the selection signals, for selectively providing light that causes the shutter strips to be selectively placed in their light-transmissive and light-absorptive states.

With respect to Claims 17 and 71, the Examiner states that "it is inherent the switching means comprises control elements which facilitates the placement of the shutter in their light-transmissive and light-absorptive states". By "switching means", the Examiner is presumably referring to certain of Jones' synchronizer switches. While synchronizer switches 48, 54, and 60 in the displays of Figs. 9, 10a, and 11 of Jones may contain multiple switching elements that function as control elements for synchronizing the switching, Claims 17 and 71 require more than the control system containing multiple elements. Claims 17 and 71 require that the control elements provide light that controls the switching of each shutter strip. Claim 79 likewise requires that the control elements provide light that controls the switching of the shutter strips.

As discussed above in connection with independent Claims 66 and 129, none of the synchronizer switches in the displays of Figs. 9, 10a, and 11 of Jones or in any of Jones' other having segmented shutters appears displays to utilize light in synchronizing the shutter switching. Consequently, none of the synchronizer switches in any of Jones' shuttered displays appear to provide light in the manner required in Claims 17, 71, and 79. This difference further distinguishes Claims 17, 71, and 79 from Jones and provides a separate basis for allowing Claims 17, 71, and 79 over Jones. The same applies to Claims 18, 19, 72 - 74, 80, 81, and 84 - 87 since they all variously depend (directly or indirectly) from Claims 17, 71, and 79.

Dependent Claims 18 and 72 each recite that "each control element is operable to provide light that causes an associated one of the shutter strips to be in a specified one of its light-transmissive and light-absorptive states".

Regarding Claims 18 and 72, the Examiner alleges that Jones "teaches a display wherein each control element is operable to provide light that causes the shutter strips/segments to be in the light-transmissive and light-absorptive states (column 3, lines 49-54)". This is incorrect. The portion of Jones parenthetically cited by the Examiner refers to a reflective display having (a) a shutter that comprises "a plurality of segments, each segment being switchable between a substantially transparent state and a strongly light-absorbing state" and (b) "illuminating means for illuminating sequentially each segment of the shutter". This reflective display is embodied by the reflective display in Jones' Fig. 11. The "illuminating means" is embodied by light source 59 which provides light that illuminates the display, specifically segmented shutter 58. However, light source 59 is not part of synchronizer switch 60 and is not utilized in synchronizing the shutter switching in the display of Fig. 11.

Likewise, the "illuminating means" in the cited portion of Jones is not part of the switching means recited in the immediately following clause at column 3, lines 55 - 61, of Jones. Hence, the illuminating means is not utilized in synchronizing the shutter switching. Contrary to what the Examiner alleges, the cited portion of Jones does not teach that "each control element is operable to provide light that causes the shutter strips/segments to be in the light-transmissive and light-absorptive states". Nor, in general repetition of what is stated above, does Jones elsewhere disclose that any control element provides light that causes any shutter strip to switch between its light-transmissive and light-absorbent states. The material recited in Claims 18 and 72 further distinguishes Jones and provides an additional separate

basis for allowing these two claims over Jones. The same applies to Claims 73 and 74 inasmuch as they both depend (directly or indirectly) from Claim 72.

Dependent Claim 73 recites that "each shutter strip is in its light-transmissive state largely while each control element associated with that strip provides light of at least a threshold value". Claim 74, which depends from Claim 73, recites that "at least one of the shutter strips is in its light-absorptive state largely while each control element associated with that strip does not provide light of at least the threshold value" during display operation.

With respect to Claim 74, the Examiner says that Jones "teaches a switching means which functions as a control component for selectively placing the shutter strips in their light-transmissive and light-absorptive states (*see* figures 1a & 1b at 4)". This statement does not appear to have any specific relevance to the further limitation of Claim 74. Perhaps the Examiner means to refer to a claim other than Claim 74.

In any case, Jones does not disclose the further limitation of Claim 74. Nor does Jones disclose the further limitation of Claim 73. Further separate bases are thus present for allowing Claims 73 and 74 over Jones.

Claims 19 and 85 each recite that "the light provided by the control elements comprises part of the light provided by the imaging lines".

The Examiner says that the "arguments discussed in Claim 6 are also applicable to Claims 19 and 85". The Office Action does not present any specific argument or reason for rejecting Claim 6 as anticipated by Jones. Accordingly, Applicants' attorney cannot determine what the Examiner means by saying that the "arguments discussed in Claim 6 are also applicable to Claims 19 and 85".

In any event, Claims 19 and 85 each require that the light provided by the control elements for controlling the shutter strips be part of the light provided by the imaging lines.

Since none of the synchronizer switches in any of Jones' displays having segmented shutters utilizes light in controlling the switching of those shutters, Jones does not disclose the further limitation of Claim 19 or 85. Furthermore, even if the synchronizer switch in one of Jones' displays having a segmented shutter did utilize light in controlling the shutter switching, Jones does not disclose that light utilized by that synchronizer switch consists of part of the light provided by the imaging lines in that display. The material recited in the further limitations of Claims 19 and 84 further distinguishes Jones and provides an additional separate basis for allowing Claims 19 and 85 over Jones.

Dependent Claim 87 recites that "each imaging or control element is light emissive".

With regard to Claim 87, the Examiner says that "Jones teaches a display wherein the imaging element is light emissive (claim 1, column 10, lines 53-68). The portion of Jones parenthetically cited by the Examiner does not teach a display in which an imaging element is light emissive. However, other material in Jones, e.g., the display of Fig. 9 and the associated text, does teach a display having light-emissive imaging elements.

In any event, Claim 87 requires that each control element be light-emissive. Jones does not disclose that any of synchronizer switches 48, 54, and 60 in the shuttered displays of Figs. 9, 10b and 11 is light-emissive. Consequently, Jones does not teach that any control element in any of synchronizer switches 48, 54, and 60 is light-emissive. An additional separate basis is present for allowing Claim 87 over Jones.

Claims 13, 14, 22 - 27, 82, 83, and 88 - 92 have been rejected under 35 USC 103(a) as obvious based on Jones in view of Nakamoto, U.S. Patent 6,031,328. This rejection is respectfully traversed in view of the revisions to the claims.

Claims 13, 14, and 22 - 27 depend (directly or indirectly) from Claim 1. Assuming *arguendo* (for the sake of argument) that a person skilled in the display art would have found

a suggestion for combining Jones and Nakamoto in the manner proposed by the Examiner, the combination of Jones and Nakamoto would not teach the full subject matter of Claim 1 and thus would not make Claim 1 obvious. Since Claims 13, 14, and 22 - 27 depend from Claim 1, Claims 13, 14, and 22 - 27 are patentable over Jones and Nakamoto for the same reasons that Claim 1 is patentable over Jones.

Similar comments apply to Claims 82, 83, and 88 - 92, all of which depend (directly or indirectly) from Claim 66. Assuming *arguendo* that a skilled artisan would have found a suggestion for combining Jones and Nakamoto, the combination would not teach the full subject matter of Claim 66 and thus would not make Claim 66 obvious. Since Claims 82, 83, and 88 - 92 depend from Claim 66, Claims 82, 83, and 88 - 92 are patentable over Jones and Nakamoto for the same reasons that that Claim 66 is patentable over Jones.

Furthermore, Claims 82, 83, and 88 - 92 all depend (directly or indirectly) from Claim 71. Taking note of the recitation in Claim 71 that "the control component comprises a group of control elements for selectively providing light that determines placement of the shutter strips in their light-transmissive and light-absorptive states", Nakamoto does not disclose, or in any way suggest, that the control elements in a control component selectively provide light for controlling the switching of a segmented shutter. As mentioned above, Jones also fails to disclose or suggest this limitation. Claims 82, 83, and 88 - 92 are thus separately patentable over Jones and Nakamoto.

Dependent Claim 82 recites that "the imaging lines and control elements emit light in response to radiation that impinges on light-emissive material of the imaging lines and control elements". Dependent Claim 88 recites that "each imaging or control element emits light in response to radiation that impinges selectively on light-emissive material of that imaging or control element".

Regarding Claims 82 and 88, the Examiner says that "Nakamoto teaches a phosphor member for each pixel formed on the surfaces of the anode electrode facing the cold cathodes (*see Abstract*)", that "This results in the formation of the light source for emitting light for each pixel (*see Abstract*)", and that "A well-known liquid crystal display panel for modulating an amount of transmission light for each pixel is provided above the light source (*see Abstract*)". While these observations seem correct, Applicants' attorney again notes that neither Jones nor Nakamoto discloses control elements that provide light for controlling the switching of a segmented shutter. Hence, neither of these two references discloses or suggests the further limitation of Claim 82 or 88. Additional separate bases are thereby furnished for allowing Claims 82 and 88 over Jones and Nakamoto. The same applies to Claims 83 and 89 since they respectively depend from Claims 82 and 88.

Dependent Claim 90 recites that "each imaging or control element emits light in response to a potential across that imaging or control element". Dependent Claim 91 recites that "each imaging or control element comprises a light valve".

With respect to Claim 90, the Examiner states that Jones "teaches a potential across the imaging element through the use of a pulsed backlight (claim 1, column 10, lines 53-66)". With respect to Claim 91, the Examiner states that Nakamoto "teaches a light modulator which controls an amount of transmission of each light emitted from the phosphor member (column 2, lines 47-50)". Irrespective of the merit of these observations, Applicants' attorney again notes that control elements which provide light for controlling segmented shutters are not disclosed in Jones or Nakamoto. Consequently, neither reference discloses or suggests the further limitation of Claim 90 or 91. This establishes additional separate bases for allowing Claims 90 and 91, along with Claim 92 which depends from Claim 91, over Jones and Nakamoto.



Claims 30 - 39, 115 - 118, and 120 - 123 have been rejected as obvious based on Jones in view of Curtin 790. For the reasons given above, this rejection is also presumed to include Claim 119. The rejection based on Jones and Curtin 790 is respectfully traversed in view of the revisions to the claims.

Curtin 790 mentions various types of displays such as liquid-crystal displays, plasma displays, and electroluminescent displays. However, Curtin 790 deals almost exclusively with flat-panel CRT displays. Although Jones mentions a conventional raster scan, i.e., deflected-beam, CRT display, Jones does not mention flat-panel CRT displays. Accordingly, it would not have obvious to combine Jones and Curtin 790 in the manner proposed by the Examiner.

Claims 30 - 39 all depend (directly or indirectly) from Claim 1. Hence, dependent Claims 30 - 39 are patentable over Jones and Curtin 790 for the same reasons that Claim 1 is patentable over Jones. Similar comments apply to Claims 115 - 123 (including Claim 119). Inasmuch as these nine claims depend (directly or indirectly) from Claim 66, Claims 115 - 123 are patentable over Jones and Curtin 790 for the same reasons that Claim 66 is patentable over Jones.

Also, dependent Claims 36 - 39 and 120 - 123 are separately patentable over Jones and Curtin 790. More particularly, Claims 36 - 39 all depend (directly or indirectly) from Claim 34. Claims 120 - 123 all depend (directly or indirectly) from Claim 118. Claims 34 and 118 each recite that the image-producing component comprises one of several displays, including a light-emitting diode display and a further display in which the imaging lines comprise phosphor that emits light to produce the display's image.

Dependent Claims 36 and 120 each recite that "the light-emitting diode display is of organic type".

Regarding Claims 36 and 120, the Examiner states that Curtin 790 "teaches the presence of a ceramic substrate that is connected with the elements (column 3, lines 65-67 to column 4, lines 1-3" and then alleges that "This ceramic substrate is naturally made of organic material". Firstly, it is extremely unlikely that the ceramic substrate in Curtin 790 is made of organic material. Most ceramics do not contain any significant percentage of carbon. Curtin 790 certainly does not disclose that the ceramic substrate is organic. Secondly, even if the ceramic substrate in Curtin 790 were organic, Curtin 790 does not disclose an organic light-emitting diode display. In fact, Curtin 790 does not appear to even mention light-emitting diode displays. For these reasons, Claims 36 and 120 are separately patentable over Jones and Curtin 790.

Dependent Claims 37 and 121 each recite that:

[T]he further display in the image-producing component comprises:  
a liquid-crystal device; and  
a phosphor-based light-emitting device which selectively emits light when excited by light provided by the liquid-crystal device.

Dependent Claims 38 and 122 each recite that:

[T]he further display in the image-producing component comprises:  
a light-providing portion;  
an electron-emitting portion which emits electrons upon being excited by light furnished by the light-providing portion; and  
a phosphor-based light-emitting device which selectively emits light when struck by electrons emitted by the electron-emitting portion.

Claims 39 and 123, which respectively depend from Claims 38 and 122, each recite that "the light-providing portion comprises an electroluminescent device".

In regard to Claims 37 - 39 and 121 - 123, the Examiner says that Curtin 790 "teaches an image-producing component which is a flat panel device, and this comprises a cathode ray tube display, liquid crystal display, plasma displays, electroluminescent and light-emitting displays (column 5, lines 59-63; column 3, lines 50-60)" and that Curtin 790 also "teaches a

flat panel display in which electrons are emitted from the cathode surface toward the phosphor coated interior of the faceplate (column 8, lines 21-28, figure 2A at 202, 203 & 206)". While this seems correct, Claims 37 and 121 each require that a light-emitting device be combined with a liquid-crystal device which provides light to excite the light-emitting device. Curtin 790 does not appear to disclose or suggest the composite light-emitting/liquid-crystal display of Claim 37 or 121. Hence, Claims 37 and 121 are separately patentable over Jones and Curtin 790.

Turning to dependent Claims 38 and 122, they each require that a light-emitting device be combined (a) with an electron-emitting portion which emits electrons to excite the light-emitting device and (b) with a light-providing portion which provides light to excite the electron-emitting portion. Curtin 790 does not appear to disclose or suggest the composite light-emitting/electron-emitting/light-providing display of Claim 38 or 122. Consequently, Curtin 790 does not appear to disclose the further limitation of dependent Claim 39 or 123 that the light-emitting portion of the composite display of Claims 38 and 122 is an electroluminescent device. For these reasons, Claim 38, 39, 122, and 123 are separately patentable over Jones and Curtin 790.

Claims 45 - 53 and 98 - 105 have been rejected under 35 USC 103(a) as obvious based on Jones in view of Waters et al, U.S. Patent 4,596,446 ("Waters"). This rejection is respectfully traversed in view of the revisions to the claims.

Claims 45 - 53 depend (directly or indirectly) from Claim 1. Assuming *arguendo* that a person skilled in the display art would have found a suggestion for combining Jones and Waters in the manner proposed by the Examiner, the combination of Jones and Waters would not teach the full subject matter of Claim 1 and therefore would not make Claim 1 obvious. Since Claims 45 - 53 depend from Claim 1, Claims 45 - 53 are patentable over Jones and

Waters for the same reasons that Claim 1 is patentable over Jones.

Claims 98 - 105 depend (directly or indirectly) from Claim 66. Assuming arguendo that a skilled artisan would have found a suggestion for combining Jones and Waters, the combination would not teach the full subject matter of Claim 66 and thus would not make it obvious. Since Claims 98 - 105 depend from Claim 66, Claims 98 - 105 are patentable over Jones and Waters for the same reasons that Claim 66 is patentable over Jones.

Furthermore, dependent Claims 48, 49, 101, and 102 are separately patentable over Jones and Waters. In particular, Claims 48 and 101 each recite that "the cholesteric twist of each shutter strip in its light-absorptive state has a twist pitch of no more than 5  $\mu\text{m}$ ". Claims 49 and 102, which respectively depend from Claims 48 and 101, each recite that "the twist pitch of each shutter strip in its light-absorptive state is no more than 3  $\mu\text{m}$ ".

Regarding Claims 48, 49, 101, and 102, the Examiner alleges that Waters "teaches a liquid crystal device with a cholesteric twist that falls within the range of 3-5 micrometers, and the liquid crystal material thickness of no more than 10 nanometers (column 2, lines 12-28)". This is incorrect with respect to the range of pitch  $p$ . The portion, col. 2, lines 12 - 28, of Waters parenthetically cited by the Examiner provides that "the ratio of layer thickness  $d$  divided by pitch  $p$ " lies "between 0.5 and 1.0 with a value of  $d$  less than 20  $\mu\text{m}$ ". In other words,

$$0.5 \leq \frac{d}{p} \leq 1 \quad (1)$$

where layer thickness  $d$  is less than 20  $\mu\text{m}$ . The preceding relationship transforms into:

$$0.5p \leq d \leq p \quad (2)$$

and then into:

$$d \leq p \leq 2d \quad (3)$$

for a given value of thickness  $d$  subject to thickness  $d$  being less than  $20 \mu\text{m}$ .

If layer thickness  $d$  were at the upper limit of  $20 \mu\text{m}$ , pitch  $p$  would fall into the range:

$$20 \mu\text{m} \leq p \leq 40 \mu\text{m} \quad (4)$$

This range clearly does not meet the limitation of Claims 48 and 101 that the pitch be no more than  $5 \mu\text{m}$ . However, layer thickness  $d$  is less than  $20 \mu\text{m}$  so that, for any given value of thickness  $d$  less than  $20 \mu\text{m}$ , pitch  $p$  falls into a range whose lower limit is less than  $20 \mu\text{m}$  and whose upper limit is less than  $40 \mu\text{m}$ .

Waters does not identify any lower limit for the value of layer thickness  $d$ . In the examples presented in cols. 6 - 8, Waters discloses values of  $6 \mu\text{m}$  and  $8 \mu\text{m}$  for cell thickness. Assuming that the cell thickness is layer thickness  $d$ , applying relationship 3 to the values of  $6 \mu\text{m}$  and  $8 \mu\text{m}$  for thickness  $d$  leads to:

$$6 \mu\text{m} \leq p \leq 12 \mu\text{m} \quad (5)$$

$$8 \mu m \leq p \leq 16 \mu m$$

(6)

No value of pitch  $p$  in the ranges specified by relationship 5 or 6 meets the requirement of Claims 48 and 101 that the pitch be no more than  $5 \mu m$ .

As far as Applicants' attorney can determine, Waters does not disclose a d or cell thickness value less than  $6 \mu m$ . Waters thus fails to disclose the further limitation of Claim 48 or 101. Likewise, Waters does not disclose the further limitation of Claim 49 or 102 that the pitch be no more than  $3 \mu m$ . Separate bases are thus provided for allowing Claims 48, 49, 101, and 102 over Jones and Waters.

Claims 54 - 56, 106 - 114, and 126 have been rejected under 35 USC 103(a) as obvious based on Curtin et al, U.S. Patent 5, 576,596 ("Curtin 596"), in view of Jones. This rejection is respectfully traversed in view of the revisions to the claims.

Curtin 596 deals with flat-panel CRT displays. As noted above, Jones does not appear to deal with, or even mention, flat-panel CRT displays. Hence, it would not have been obvious to combine Curtin 596 and Jones in the manner proposed by the Examiner.

Claims 54 - 56 depend (directly or indirectly) from Claim 1. Accordingly, Claims 54 - 56 are patentable over Curtin 596 and Jones for the same reasons that Claim 1 is patentable over Jones. Similar comments apply to Claims 106 - 114 and 126. Inasmuch as these nine claims all depend (directly or indirectly) from Claim 66, Claims 106 - 114 and 126 are patentable over Curtin 596 and Jones for the same reasons that Claim 66 is patentable over Jones.

Furthermore, dependent Claims 107 - 114 are separately patentable over Curtin 596

and Jones for the reasons presented below.

Dependent Claim 107 reads as follows:

107. A display as in Claim 106 wherein, in addition to the shutter strips, the liquid-crystal structure includes:

a third electrical conductor; and

a group of switches physically connected to the third conductor, each switch physically connected to a different corresponding one of the first conductors and being operable to electrically couple the corresponding first conductor to the third conductor when sufficient light from an associated one of the control elements strikes that switch or to electrically decouple the corresponding first conductor from the third conductor when sufficient light from an associated one of the control elements strikes that switch.

Dependent Claim 112, which now depends from Claim 107, recites that "the first and third conductors are spaced vertically apart from each other largely opposite the associated control elements". Dependent Claim 113, which depends from Claim 112, recites that "the third conductor is light reflective".

Regarding Claims 107, 112, and 113, the Examiner says that Curtin 596 "teaches electron-emissive elements situated over the second plate (figure 3B at 313 & 315)" and that "This is analogous to a third electrical conductor as claimed by applicant". After noting that Curtin 596 does not teach switching means, the Examiner states that Jones "teaches a switching means for switching the shutter synchronously with the pulsed backlighting such that the shutter is in its substantially transparent state when the source of pulsed backlighting is in its light emissive state (column 3, lines 1-5)".

Claim 107 requires that a liquid-crystal structure contain a third conductor and a group of switches connected to the third conductor. A liquid-crystal structure does not contain electron-emissive elements. Accordingly, Applicants' attorney does not see how Curtin 596's teaching of electron-emissive elements situated over a plate can be deemed analogous to the third conductor of Claim 107. Curtin 596 and Jones do not together

disclose or suggest the further limitation of Claim 107. This makes Claim 107 separately patentable over Curtin 596 and Jones. The same applies to Claims 108 - 114 since they all depend (directly or indirectly) from Claim 107.

Turning specifically to dependent Claims 112 and 113, the further limitation of Claim 112 is directed to the embodiment of application Figs. 13 - 15 in which first conductor 176 is spaced vertically apart from third conductor 182 in light shutter 54 implemented as a liquid-crystal structure. Curtin 596 and Jones do not disclose or suggest the further limitation of Claim 112 that such first and third conductors are spaced vertically apart from each other in a liquid-crystal structure. In this regard, Applicants' attorney notes that the electron-emissive elements in Curtin 596 might be viewed as spaced laterally apart from each other but not as being spaced vertically apart from each other. Curtin 596 and Jones do not disclose or suggest the further limitation of Claim 113 that the third conductor be light reflective. These distinctions provide additional separate bases for allowing Claims 112 and 113 over Curtin 596 and Jones.

Dependent Claim 108 recites that "each switch comprises light-sensitive material that (a) goes from a specified one of an electrically insulating condition and an electrically conductive condition to the other of the conditions when struck by sufficient light of a specified type and (b) returns to the specified condition when not being struck by sufficient light of the specified type". Claim 109, which depends from Claim 108, recites that " the specified condition is the insulating condition whereby the light-sensitive material goes from the insulating condition to the conductive condition when struck by sufficient light of the specified type".

With respect to Claims 108 and 109, the Examiner says that Curtin 596 "teaches a display that contains a transparent electrically insulating flat faceplate and an electrically



insulating flat backplate (column 4, lines 48-59, figure 2 at 302 & 303)" and that Curtin 596 "teaches how the light-emissive regions (313) produce light of various colors, and how the ridges (314) which are non-emissive form a black matrix for region when they are struck by electrons emitted from electron-emissive elements (column 5, lines 64-67 to column 6, lines -1-5". After again noting that Curtin 596 does not teach switching means, the Examiner says that Jones "teaches a switching means for switching the shutter synchronously with the pulsed backlighting such that the shutter is in its substantially transparent state when the source of pulsed backlighting is in its light emissive state (column 3, lines 1-5)".

As noted above, Claim 108 requires that each switch comprise light-sensitive material. While the preceding comments made by the Examiner about Curtin 596 and Jones in connection with Claims 108 and 109 seem accurate, Curtin 596 and Jones do not disclose or suggest a switch which consists of light-sensitive material and is utilized in a display having a segmented shutter. Nor do Curtin 596 and Jones disclose the further limitation of Claim 109 that the light-sensitive material go from the insulating condition to the conductive condition when struck by sufficient light of the specified type. Additional separate bases are thus present for allowing both of Claims 108 and 109 over Curtin 596 and Jones.

Dependent Claim 110 recites that "the light-sensitive material comprises amorphous semiconductor material".

Regarding Claim 110, the Examiner says that Curtin 596 "teaches that the faceplate consists of glass, and the backplate consist of glass, ceramic, or silicon (column 4, lines 54-57, figure 2 at 302 and 303)". Neither glass nor ceramic is a semiconductor. Although silicon is a semiconductor, the silicon used in a backplate would almost certainly be monocrystalline silicon and thus not amorphous silicon. Curtin 596 thus does not disclose the further limitation of Claim 110. Hence, an additional separate basis is present for allowing

Claim 110 over Curtin 596 and Jones.

Dependent Claim 111 recites that "the first and third conductors are spaced laterally apart from one another".

In regard to Claim 111, the Examiner alleges that Curtin 596 "teaches an optical device which contains first (302) and second plates (303), and which are laterally separated from one another by a pattern of ridges (314) situated over the first plate, light-emissive regions (313) situated in spaces between the ridges, electron-emissive elements (309) that maintains the desired spacing between the plates (*see Abstract*)". After noting that Curtin 596 does not teach shutter strips, the Examiner says that Jones "teaches the presence shutter strips in his liquid-crystal device". Applicants' attorney does not see how these teachings of Curtin 596 and Jones have any relevance to the further limitation of Claim 111. In fact, Applicants' attorney cannot even determine which elements of Jones are being analogized to the first and third conductors of Claim 111.

The further limitation of Claim 111 is directed to the embodiment of application Figs. 10 - 12 in which first conductor 176 is spaced laterally apart from third conductor 182 in light shutter 54 implemented as a liquid-crystal structure. Curtin 596 and Jones do not disclose or suggest the further limitation of Claim 111 that such first and third conductors be spaced laterally apart from each other in a liquid-crystal structure. An additional separate basis is thus provided for allowing Claim 111 over Curtin 596 and Jones.

Dependent Claim 114 recites that "each switch comprises a phototransistor".

With reference to Claim 114, the Examiner says that Jones "teaches a synchronizer switch that produces a contrast in the display by producing a net effect of producing a bright image when the image is projected, and a dark image during other times (*see Jones et al* column 4, lines 54-62)" and then alleges that "This type of switch inherently containing a

phototransistor". While it is possible that one or more of synchronizer switches 48, 54, and 60 in the respective displays of Figs. 9, 10b, and 11 of Jones contain a phototransistor, none of switches 48, 54, and 60 appears to utilize light to control shutter switching. Accordingly, it is not inherent that any of switches 48, 54, and 60 contains a phototransistor.

In any case, the further limitation of Claim 114 specifies that each switch comprises a phototransistor in a liquid-crystal structure. As far as Applicants' attorney can determine, neither Curtin 596 nor Jones discloses that a switch in a liquid-crystal structure contains a phototransistor. For these reasons, an additional separate basis is present for allowing Claim 114 over Curtin 596 and Jones.

To summarize, Claims 1 - 4, 6 - 59, and 66 - 130 have been shown to be patentable over the applied art. Accordingly, Claims 1 - 4, 6 - 59, and 66 - 130 should be allowed so that the application may proceed to issue.

Please telephone Applicants' attorney at 408-453-9200, ext. 1371, if there are any questions.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: COMMISSIONER FOR PATENTS, Washington, D.C. 20231, on December 22, 2000.

Ronald J. Meetin 22 Dec. 2000  
Attorney for Applicants Date of Signature

Respectfully submitted,

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